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EDITORIAL.

Malayan Rice Production.

With the conclusion of the 1933-34 season for padi production in Malaya, the time is ripe for an annual review of the progress of the work performed at the numerous rice experiment stations throughout Malaya.

Those who study at all closely the articles, which appear in the pages of this Journal from time to time, on the conduct, progress and achievements of the rice work of the Department, will realise that there is to-day close co-ordination in the work throughout the country. The method which now obtains, of conducting similar experiments in many centres, enables more reliable conclusions to be drawn therefrom, and the contrast of results obtained under the differing local conditions, as well as the similarities which become evident in spite of varying local factors, frequently emphasise points which under other conditions might be less evident, or - in fact - overlooked.

The review of the season's work and results will be published in three articles, the first of which, entitled "Padi Manurial Experiments 1933-34" is included in this number.

Experiments on the manuring of padi have been made from time to time in various parts of Malaya. The results have at best been inconclusive. It must be remembered that manurial experiments with an irrigated crop, such as padi, present unique difficulties to overcome which special technique is necessary.

From the series of experiments which have been made on the subject of manuring of "wet" padi, emerge two facts of significance. The more important of these facts is the bar to higher yields which is found to apply to almost all padi areas in Malaya. There are, however, isolated areas where yields considerably higher than the bar are usual; the knowledge of the existence of such areas is a starting point for further investigations having for their object the elimination of the causes restricting crop production.

The second fact which has so far emerged from investigations is that where manuring has given an increased yield, phosphorus has been the essential element. The form in which this fertilizer should be applied, in what quantities, and at what time, are questions under consideration.

The importance of cultivation and the reaction of manures to conditions of cultivation of the crop are widely recognised. The present series of experiments has, therefore, been designed to give due weight to these factors. Although finality has not yet been reached, considerable progress has been made and in some instances, definite recommendations can be made regarding economic manuring of the padi crop.

Pollination of Oil Palms.

An oft-discussed but imperfectly understood subject of discussion centres on the pollination of the oil palm. The subject is, however, of such great importance that the planter cannot afford to neglect any aspect of it. He is committed to a policy of obtaining the maximum yield of fruit commensurate with the maintenance of vitality and normal development of the palm, but is handicapped by a not very precise knowledge of the method of natural pollination, of the normal or natural fruiting ability of the palm at different ages, or of the degree of artificial pollination which is advisable; if, in fact, taking a long view, artificial pollination is at any time justified.

Although we may feel how incomplete our knowledge is on this subject, the accumulated evidence of the past few years appears to counsel a conservative policy of artificial pollination. This policy receives further support from the observations of Mr. R. B. Jagoe, described in an article on the subject of pollination of oil palm, which is included in this number. The author contends that the oil palm is almost entirely wind-pollinated and shews that on an oil palm plantation, naturally wind-borne pollen is likely to provide the optimum pollination. On young palms, natural pollination may be less complete and artificial pollination will, therefore, result in greatly enhanced crops.

Organisation of Weekly Fairs.

H. H. Tunku Yacob, a son of H.H. The Sultan of Kedah, has prepared, at our request, a comprehensive account of the organisation of weekly fairs in the State of Kedah. By virtue of his official post of Assistant Principal Agricultural Officer, Kedah, the author has been intimately connected with the transforming of the earlier efforts to establish such fairs into the present organised and efficient system.

Weekly fairs have been started in many parts of Malaya. In some cases they have proved successful; in many others, interest has waned after the first flush of enthusiasm. But whether they have succeeded or failed, their desirability is admitted, and we suggest to those concerned that the experience obtained in Kedah will repay careful study.

The author has placed at our disposal much additional information concerning the conduct and development of these fairs in Kedah. Space forbids the presentation of all these facts in this Jounral. Many of them are of local value, but readers who desire to examine this subject in greater detail, with a view to the development of similar fairs in other States, would be well-advised to get into touch with this Department when all available information will be forthcoming.

Original Articles.

PADI MANURIAL EXPERIMENTS 1933-1934

BY

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Chief Research Officer.

Summaries of results of manuring of padi have been given in this Journal for December 1932 and 1933. Once again the writer wishes to make it clear that the various Officers in charge of Stations should be regarded as co-authors of this series of articles.

The deductions drawn from previous experimental work were—

(*a*) That whenever fertilizers gave results, phosphorus was found to be the essential element.

(*b*) That there appeared to be a bar above which yields could not be raised by any system of manuring likely to be economic, either alone or in conjunction with close planting. The bar apparently varied from 400 to 550 gantangs (2,200 to 3,000 pounds) per acre, depending on soil type and water conditions and where, as is generally the case on the Stations, the normal yield approaches the hypothetical bar, manuring with commercial fertilizers gave only uneconomic increases.

Results in tanks indicated a considerable effect from the late addition of green matter on the surface of the soil and a similar good effect is observed from the bunds of cut vegetation used in the Krian District.

For the season under review, a complex experiment was accordingly designed to test the effect of the addition of green matter combined with manuring and with different forms of surface cultivation (this last at the suggestion of the Director of Agriculture).

Cultivation.—This took the form of (i) "changkolling"* to a depth of 6 in. to 7 in. as early as practicable before planting, designated "CE" (changkol early), (ii) similar treatment carried out as late as possible, "CL" and (iii) "tajaking" (in which existing vegetation was cut near or just below the inundated surface) just before planting, "T".

On the early changkolled plots, growing weeds or straw on the surface at the time of changkolling were turned in and just before planting these plots were either (*a*) re-changkolled wet to a depth of 5 in. to 6 in., the existing weed growth being buried (G. B.—*i.e.* green manure buried) or (*b*) re-changkolled very lightly or, if possible, tajaked—cut weeds remaining on or very near the surface (G. S.).

* Cultivation with a mattock or digging hoe, locally termed *chankol.*

On the late changkolled plots, the plots had either (*a*) vegetation buried, (G. B.) or (*b*) vegetation cut and removed before changkolling and afterwards replaced on the surface (G. S.).

On the tajaked plots, vegetation was all left on or near the surface (G.S.).

There were thus five surface treatments :—

C.E. G.B.; C.E. G.S.; C.L. G.B.; C.L. G.S.; and T. G.S.

Plots carrying each of these treatments were divided into half-manured (M) and unmanured (O). Manured plots received a dressing at the rate of 100 lbs. sulphate of ammonia and 200 lbs. superphosphate per acre. These sub-plots were 1/120th acre each.

The lay-out was as follows :

Direction of Water Flow ↓

Columns	A	B	C	D	E
Rows I	C|E G|S O|M	C|E G|S M|O	C|L G|S M|O	C|L G|S O|M	T G|S M|O
II	C|L G|S O|M	C|L G|B M|O	T G|S M|O	C|E G|B O|M	C|E G|S M|O
III	T G|S O|M	C|L G|B M|O	G|E G|S M|O	C|E G|B O|M	C|L G|S M|O
IV	C|E G|S O|M	C|E G|B M|O	C|L G|S M|O	C|L G|B O|M	T G|S M|O

Double lines indicate bunds.

It will be noted that the lay-out is not strictly randomised; it was desired to avoid diffusion of nutrients as far as possible. The departure from strict randomisation was of less importance than it might normally have been in that the object of this somewhat elaborate experiment was to look, not for increases of the order of 10 or 20 per cent., but for large increases of yield which would suffice to take yields over the hypothetical bar.

On some of the Stations, the shape of the available land did not permit of the key-plan being strictly followed and columns or rows were placed end to end.

In Malacca there is little or no inter-season weed growth and extraneous non-leguminous green matter was brought in and used at the rate of 10 tons per acre.

The main experiment was carried out at the Experimental Stations at Titi Serong and Talang in Perak, Bukit Merah in Province Wellesley, Pulau Gadong in Malacca, at the Departmental Test Plots of Briah and Kuala Kurau in Krian, and, by the courtesy of the Kedah Government, at the Telok Chengai Station in that State. Results and general observations are as follows:—

Kedah.

Telok Chengai. Padi used: selected strain Radin 2. The area selected for the experiments had not been manured for three seasons, but had during this period been well cultivated by the usual methods of ploughing, raking and rolling and all straw had been returned to the soil.

Operations were carried out as follows:—

"C.E." Changkolled to a depth of 6in. to 7in, 16 weeks before planting. Re-changkolled 10 days before planting.

"C.L." Changkolled 11 days before planting.

"T." Tajaked 28 days before planting.

Manures were applied 3 days before planting.

The plots changkolled early made the best growth, but as will be seen later, did not give highest yields. The results are shewn in Table I.

Table I.

Cultivation and Green Manuring Experiment at Telok Chengai, Kedah. Mean Yields in Pounds of Padi.

Treatment	Pounds per 1/120th acre.		Pounds per 1/60th acre.	Gantangs per acre*
	Manured	Control	Manured + Control	M + O
C.E. G.B.	21.8	20.5	42.3	442
C.E. G.S.	24.0	21.2	45.2	472
C.L. G.B.	20.0	17.9	37.8	399
C.L. G.S.	24.5	22.0	46.4	484
T. G.S.	24.9	23.3	48.2	508

*Calculated from weight of samples from each treatment which ranged from 5.68 to 5.75 pounds per gantang.

As manures gave only small increases ranging from 6.5 to 13.6 per cent. and as inspection shows interaction between manures and treatments to have been absent, results were not statistically analysed with respect to manures but only with respect to treatments. This analysis showed significant differences to have occurred and the minimum difference required for significance ($P = .05$) between any two treatments to be 3.0 lbs.

The real inferiority of green matter buried may possibly be ascribed to the ill effects of products of anaerobic decomposition, or to locking up of available supplies of nitrogen as a result of enhanced growth of the soil flora. The inferiority of early changkolling might be conceived to be due to the stirring up of toxic sub-soil, but for the facts that these plots showed superiority of early growth when toxicity should have been at its maximum and that padi roots normally penetrate below 6 or 7 inches, the limit of cultivation in this experiment.

Perak.

Titi Serong, Briah and Kuala Kurau. The experimental plots at Briah suffered from such severe rat damage that no deductions can be drawn from the results obtained. At Titi Serong, owing to the shape of the experimental block, the lay-out was modified by placing the 3rd, 4th and 5th columns of the key-plan above the 1st and 2nd. At the time it was not realised that the effect of the bunds of decaying vegetation used in the District was as extensive as observation on another experiment proved it to be, and the possibility exists that the outer columns were unduly favoured—as these all had green matter laid on the surface, any excess in yield of this treatment would be under suspicion. As a matter of fact, the run of yields in the sub-plots indicated that there was little or no bund effect in this block, even the outermost columns being too far from the bunds for it to manifest itself, but the results cannot be regarded as absolutely above suspicion.

At Kuala Kurau the standard lay-out was adopted.

At all three Stations early changkolling was done 17 weeks, and late changkolling 2 to 3 weeks before planting; tajaking, following local procedure, was carried out 5 to 6 weeks before planting. Results given in Table II have not been analysed as there are obviously no differences of the order sought—inspection suggests that minimum differences for significance would not exceed 15 per cent. of the mean.

The early changkolled plots showed better vegetative growth but this was not reflected in yield.

Talang.

The lay-out had to be varied at this Station by placing columns C, D and E at right angles to A and B; the direction of water flow was in both cases down the column.

Table II.

Cultivation and Green Manuring Experiment at Titi Serong and Kuala Kurau Stations. Mean Yields in Pounds of Padi.

Treatment	Titi Serong			Kuala Kurau		
	Manured 1/120th acre	Control 1/120th acre	Total 1/60th acre	Manured 1/120th acre	Control 1/120th acre	Total 1/60th acre
C.E. G.B.	24.6	15.1	49.7	31.4	31.4	62.8
C.E. G.S.	27.6	24.1	51.7	31.3	29.1	60.4
C.L. G.B.	23.4	24.0	47.4	28.3	28.6	56.9
C.L. G.S.	24.3	22.0	46.3	30.0	28.1	58.1
T. G.S.	25.8	25.6	51.4	28.1	30.5	56.6

Early changkolling was carried out 18 weeks before planting; re-changkolling, late changkolling and tajaking and manuring at the time of planting.

Ripening was uneven and the harvesting period was unduly prolonged, extending over three weeks. The results are shewn in Table III.

Table III.

Cultivation and Green Manuring Experiment at Talang Station. Mean Yields in Pounds of Padi.

Treatment	Mean Yield Pounds per 1/120th acre		1/60th acre	Gantangs per acre (calculated)
	Manured	Unmanured	M + O	M + O
C.E. G.B.	26.2	22.5	48.7	532
G.S.	23.8	19.4	43.2	471
C.L. G.B.	22.6	16.8	39.5	430
G.S.	24.4	21.8	46.2	504
T. G.S.	21.3	18.4	39.7	432
Mean	23.7	19.8		

Minimum differences for significance are for manures 1.13 pounds per 1/120th acre and for treatments 6.0 pounds per 1/60th acre. There is no significant interaction between treatments and manures.

Province Wellesley.

Bukit Merah. Columns had to be displaced to fit available land. Early changkolling was carried out 13 weeks and re-changkolling immediately before planting, late changkolling 4 weeks and tajaking 2 weeks before planting. Results are given in Table IV and the minimum difference for significance between any two treatments is 9.5 pounds per 1/60th acre.

Table IV.

Cultivation and Green Manuring Experiment at Bukit Merah Station. Mean Yields in Pounds of Padi.

Treatment	per 1/120th acre		per 1/60th acre
	Manured	Control	Total
C.E. G.B.	22.5	24.2	46.7
C.E. G.S.	25.9	26.3	52.2
C.L. G.B.	18.6	21.7	40.3
C.L. G.S.	23.0	25.8	48.8
T. G.S.	23.7	24.7	48.4

Malacca.

Pulau Gadong.—Early changkolling was carried out four weeks before planting in the field, final preparation of "C.E." and sole cultivation of "C.L." and "T." plots from seven to seventeen days and manuring seven days before planting.

Minimum difference of significance between any pair of treatments is 8.2 lbs. and for manured over unmanured plots as a whole 1.5 lbs. The "Z" value for interaction is less than that required for significance, a somewhat surprising result in view of the considerable difference in the effect of manure in C.E. G.B., and T. G.S. This absence of significance is attributable to considerable variation within C.E. G.B.

Table V.

Cultivation and Manuring Experiment at Pulau Gadong Station. Mean Yields in Pounds of Padi.

Treatment	Mean Yield. Pounds per			Gantangs per acre (calculated)
	1/120th acre		1/60th acre	
	Manured	Unmanured	M + O	M + O
C.E. G.B.	23.5	23.5	47.0	510
C.E. G.S.	24.4	20.4	44.8	487
C.L. G.B.	25.4	24.7	50.1	546
C.L. G.S.	23.8	20.9	44.7	487
T. G.S.	25.0	19.4	44.4	483
Mean	24.4	22.3		

General.

Very clearly in no single instance have the treatments undertaken given the substantial increases sought. In view of the possibility that deep cultivation may have a delayed beneficial action it has been decided for the coming season to treat all the plots in these experimental blocks uniformly according to the system adopted locally, *e.g.* tajak in Krian, plough and rolling in Malacca and so on. Any residual effect should thus be found.

Other Manurial Experiments.

In addition to the main experiment other simpler experiments were carried out at some of the Stations; these are described below.

Kedah.

Effect of Phosphate Fertilizers. Experiment to test the economic results, if any, likely to accrue at the present low price of padi, from application of phosphate fertilizers known to give 10 to 20 per cent. increase of yield.

A four-way Latin Square of 1/120th acre plots was laid down with the treatments and results given below on land at Telok Chengai Station which had received no manure for the past three seasons.

Difference required for significance between any two treatments (P = .05) = 2.4 lbs. per 1/120th acre.

Table VI.

Phosphate Fertilizer Experiment at Telok Chengai Station.

Treatment	Rate pounds per acre	Yield	
		Pounds of Padi per 1/120th acre	Gantangs of Padi per acre (calculated)
I. Control		14.9	356
II. Bat guano * 21.9 per cent. I P_2O_5	500	20.1	416
III. - do - II	250	19.0	395
IV. Superphosphate 18 to 20 per cent. P_2O_5	200	21.9	454

The land was ploughed, raked and rolled prior to planting.

The cost of the local phosphate including freight was $5.04 per ton; that of superphosphate was $55 per ton. With padi at 5 cents per gantang, profit was: local phosphate 500 lbs. $2.63 per acre, 250 lbs.—$2.14 per acre and superphosphate $0.74 per acre. This shows that the local practice of drawing on local deposits is justified when the unmanured yield is of the order of 350 gantangs or less, more especially as some residual effect is certain. Comparison of this simple experiment with the main experiment furnishes yet another indirect confirmation of the existence of the bar. In the main experiment, unmanured yields were higher, ranging from 17.9 to 23.3 pounds per 1/120th acre, and increases due to manures were correspondingly smaller, ranging from 1.3 to 2.8 pounds per 1/120th acre.

Residual Effect. Early in the season it was noticed that the padi on the plots manured in 1932—1933 for the planting distance experiments (described on page 633 of this Journal for December, 1933) was making better progress than that on the unmanured plots. Yields of the old plots were in consequence recorded. No manure was applied in 1933-1934.

* This so-called guano contains so little nitrogen that it may be regarded as a purely phosphatic manure.

Table VII.

Residual Effect of Fertilizers on Padi, Telok Chengai Station. Yields of Padi in the Season 1933-34.

Treatment 1932-33	Yield 1933-1934	
	Pounds per 1/40th acre	Gantangs per acre calculated.
I. "Chellup"	65.1	482
II. Superphosphate 360 lbs. per acre	70.3	520
III. Super + ammonium sulphate as II + 110 lbs. ammonium sulphate	71.4	529
IV. Control	63.8	472

The Z value was .50 against .68 (P = .05) required for significance, but the minimum difference for significance required is 7.6 lbs. per 1/40th acre *i.e.* there is a strong probability, not amounting to odds of 20 :1, that significance has been attained by II and III.

It must be remembered that the application of phosphate was heavy.

At Langgar in Kedah, a purely exploratory experiment was laid down in which four different varieties of padi were tried, arranged in a four-way Latin Square; two plots of each variety received 1,000 lbs. per acre of local phosphate. (This is the usual local application, repeated every third year).

Assuming, and there is evidence for the assumption, that there is no differential response of varieties to manuring, analysis shows that the increase obtained was significant; mean yield of manured plots was 21.5 lbs. per 1/120th acre and of unmanured 17.2 pounds.

Kelantan.

Pasir Putch. A. Last year an experiment of six randomised blocks of 1/40th acre plots was carried out at this Station and described on page 635 of the December 1933 *Malayan Agricultural Journal.* This season the plots were observed for residual effect, except those carrying treatments 5 and 6, which received 5 tons green manure and 2 cwts. local phosphate per acre respectively. The results are given in Table VIII.

Table VIII.

Residual Effect of Fertilizers on Padi, Pasir Puteh Station. Mean Yields of Padi.

Treatment - 1932 - 1933.	per 1/40th acre		Gantangs per acre (calculated)* 1933-1934
	1932-33	1933-34	
1. Basic slag 2 cwts. cyanamide 1½ cwts. sulphate of potash 1 cwt. per acre	64.3	45.6	332
2. Superphosphate (16 per cent.) 2 cwts.	55.2	42.8	311
3. Superphosphate + sulphate of ammonia 1½ cwts.	58.5	44.8	326
4. Basic slag 2 cwts. + cyanamide 1½ cwts.	57.5	46.4	337
5. Green manure 1 ton	44.7	46.8	340
6. Local manure†	41.0	40.8	297
7. Local bat guano (P_2O_5 16 per cent. N 1.8 per cent.) 4 cwts.	56.3	45.0	327
8. Control	33.8	34.8	253

Minimum difference for significance between any two treatments = 9.3 lbs. per 1/40th acre. Minimum increase over control for significance = 6.6 lbs. per 1/40th acre.

All treatments showed a significant increase, or significant residual effect, over the control.

B. In view of the large increase obtained by the use of local phosphate in 1932—1933, a simple experiment consisting of two three-way Latin Squares was laid down with plots of 1/120th acre each. The land had previously been used as a nursery and had received a uniform dressing of 1½ cwts. Niciphos per acre. Applications and results are shown in Table IX.

* Calculated from weight at the rate of 1 gantang = 5.5 lbs.

† A mixture of burnt soil, burnt cow dung and ashes of coconuts and areca leaves in general use in Kelantan under the name "Baja Bakar".

Table IX.

Manuring with Local Phosphate at Pasir Puteh Station. Mean Yields of Padi.

Treatment	Mean Yield pounds per 1/120th acre
Square A.	
Control	12.0
Bat Guano * 1 cwt. per acre	11.2
Bat Guano 2 cwts. per acre	11.0
Square B.	
Control	13.0
Bat Buano 3 cwts. per acre	14.5
Bat Guano 4 cwts. per acre	16.3

Variation was so great that no increases were significant. (The undesirable statistical lay-out was imposed by the lie of the land).

The small response from even as much as 4 cwts. of fertilizer per acre is surprising.

Central Experiment Station. Experiments were laid down to test a number of acid and basic mixtures, cow dung and green manure on (*a*) dry and (*b*) wet padi, (*c*) the optimum rate of application of local phosphate and (*d*) the optimum N/P ratio.

There was extensive lodging with some loss of seed, and bird and rat damage; for this reason, and because there are no differences of importance between the yields from various treatments and the controls, analysis has not been undertaken, and detailed results are not given.

Treatments were as follows:—

Experiments A and B were laid out in four six-way Latin Squares, two with dry and two with wet padi on 1/40th acre plots. The results are stated in Table X.

* Containing P_2O_5 8 per cent. and N 0.8 per cent.

Table X.

Manuring "Wet" and "Dry" Padi at the Central Experiment Station, Kelantan.

Mean Yield pounds of Padi per 1/40th acre.

	Treatment	Rate per acre	Dry Padi	Wet Padi
1.	Cyanamide Basic slag Sulphate of potash	1½ cwts. 2 „ 1 „	42.5	59.5
2.	Superphosphate	2 „	45.6	64.8
3.	Superphosphate Sulphate of ammonia	2 „ 1½ „	46.8	56.3
4.	Basic slag Cyanamide Followed 1 month later by an additional 1 cwt. cyanamide	2 „ 1½ „	46.3	58.3
5.	Basic slag Cyanamide	2 „ 1½ „	49.3	63.5
6.	*Control*		*48.1*	*61.3*
7.	Green manure Bat guano	10 „ 3 „	48.8	56.7
8.	As 7 + sulphate of potash	1 „	47.8	62.6
9.	Bat guano Sulphate of potash	3 „ 1 „	45.7	61.6
10.	Cow dung	5 tons	51.3	62.0
11.	Local manure		47.9	63.7
12.	*Control*		*46.1*	*61.5*

Experiment C with "wet" padi was laid out as a four-way Latin Square with 1/60th acre plots. Results are stated in Table XI.

Table XI.

Experiment in Optimum Rate of Application of Local Fertilizer at the Central Experiment Station, Kelantan.

Treatment	Rate per acre	Mean yields pounds of Padi per 1/60th acre.
Bat guano	1 cwt.	59.1
„ „	2 cwts.	59.6
„ „	3 „	55.4
Control		57.6

Experiment D with wet padi was laid out in a four-way Latin Square with plots of 1/60th acre. Means ranged from 37.9 pounds to 58.2 pounds per 1/60th acre, but there was considerable loss of grain and such great variation between plots that the results are valueless.

Province Wellesley.

Bukit Merah. Three additional experiments were carried out at Bukit Merah :—

(*a*) a simplified version of the main experiment, on land used to test the possibilities of inter-season cultivation of vegetables.

(*b*) an experiment to test the effect of cattle manure.

(*c*) an experiment to compare different methods of preparing the land.

A. Late changkolling, with and without turning in of green matter, was compared with tajaking in three replications on plots of 1/80th acre divided into sub-plots of 1/160th, manured and unmanured. Limitation of space prevented further replications on larger plots. Results are shewn in Table XII.

Table XII.

Cultivation and Manuring Experiment at Bukit Merah Station. Mean Yields of Padi in Pounds.

Treatment	Mean yield pounds		
	Per 1/160th acre		Per 1/80th acre M. + O.
	Manured	Unmanured	
C.L. G.B.	23.2	23.4	46.6
C.L. G.S.	23.8	23.5	47.3
T. G.S.	24.1	24.5	48.6

Obviously there are no significant differences; from inspection the experimental error is small.

The mean yield is high, of the order of 680 gantangs per acre. Unfortunately, this piece of land is the most favoured by water supply on the Station, so that the part played by the intensive cultivation incidental to vegetable cultivation cannot be estimated.

B. A four-way Latin Square with plots of 1/120th acre was laid down as in the season 1932—1933 (this Journal page 637, December 1933) except that lime was omitted from treatment C. Results are stated in Table XIII.

Table XIII.

Manuring Experiment at Bukit Merah Station. Mean Yields of Padi in Pounds.

Treatment	Rate per acre	Mean Yield		Mean Yield 1932—1933 Gantangs per acre. (calculated)
		Pounds per 1/60th acre	Gantangs per acre (calculated)	
A. Cattle manure	20 tons	28.9	630	510
B. „ „ + ammonium phosphate 20 :20	2½ „ 100 lbs.	26.0	566	475
C. Ammonium phosphate	300 „	26.4	573	435
D. Control		24.5	535	368

Minimum difference for significance between any two treatments = 2.6 lbs. per 1/120th acre. Minimum increase over control for significance = 1.8 lbs.

C. An experiment to compare ploughing, changkolling and tajaking, gave no significant differences as is shewn in the results stated in Table XIV.

Table XIV

Effect on Yield of Padi of Method of Cultivation. Bukit Merah Station.

Season	Ploughing Per cent.	Changkolling Per cent.	Tajaking Per cent.
1931—32	108	102	100
1932—33	123	113	100
1933—34	105	98	100

Perak.

Selinsing. The experiment to test tajaking against changkolling combined with manuring reported last year (page 638 *loc. cit.*) was repeated. Mean results in pounds of padi per 1/80th acre are stated in Table XV.

Table XV.

Cultivation and Manuring Experiment at Selinsing Station. Mean Yields of Padi.

Treatment	Control	P	N. P.	Mean
Changkol	28.4	32.4	31.1	30.4
Tajak	20.4	24.2	25.0	23.2
Mean	24.4	28.3	28.1	

The minimum significant difference between changkol and tajak is 3.1 lbs. and between manures 3.4 lbs.

Last season changkolling was done after water was on the land; this season it was done during fallow.

Summary.

Once again attempts to lift yields over the "bar" have failed. Were it not for the existence of small patches of land regularly giving authentic yields of the order of 800 gantangs (4,400 pounds) per acre, it might be assumed that climatic conditions precluded really high yields of the order of those obtained in Japan, Spain and Italy. Such patches do, however, exist and investigation must continue.

The most promising result of the season's work is the fact which emerges from the Kedah experiment with local bat guano, that economic results may follow manuring with water-insoluble phosphates if, in spite of favourable water and weather conditions, yields do not approach within fifty gantangs of the "bar" and if fertilizer can be cheaply obtained.

Hitherto, only districts in close proximity to local deposits could benefit, imported fertilizers being far too expensive for this purpose. Recently, however, it has become possible to obtain locally, finely divided imported rock phosphate (P_2O_5 content 39 per cent.) at rates which, with properly organised distribution to avoid excessive middleman's profit, should not exceed $1.60 to $1.80 per cwt. in padi districts. Should experiments show that this material is efficient for the purpose, (and there is reason to believe that it will be) fifty gantangs increase, with padi even at six cents, would show a profit.

It is proposed to test this fertilizer during the 1934—1935 season.

OBSERVATIONS AND EXPERIMENTS IN CONNECTION WITH POLLINATION OF OIL PALMS

BY

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A question of considerable importance on many oil palm estates in this country is whether an increase in fruit production is obtained as a result of artificial pollination of the flowers of female inflorescences, or whether the amount of natural pollination which occurs provides the maximum economic yield.

As an approach to an examination of this subject, a study of the way or ways in which natural pollination is effected, was initiated.

Oil palms are undoubtedly wind pollinated. It has been stated occasionally, however, that various insects may also be concerned with pollination. This contention is probably largely due to the strong smell of aniseed given off by fresh pollen, and in a lesser degree, by receptive female flowers. (1) (2) (3) (4) (5).

The large monoecious inflorescences, the great abundance of small, dry, smooth pollen grains, the inconspicuous female flowers with large, slightly hairy stigmas, protruded and exposed at maturity, all indicate wind pollination (6).

Although neither the anthers nor the male inflorescences are easily disturbed by wind, nevertheless the inflorescences are borne on stalks long enough to project them well up from the axils of the leaves and produce pollen in such great quantities and over such large and exposed surfaces, that the wind can easily and gradually bear it away.

There is nothing to prevent successful pollination by almost any insect, but neither does there seem to be any property of the female flower to attract insects, except for the mild scent of aniseed.

A possibility, of course, is that winged pollen-feeders (certain beetles and flies) attracted to the male flowers in the first place by their stronger scent, might subsequently alight on a nearby female flower in pursuit of the same smell.

No recorded observations have clearly shown this, however, and pollen-collectors, such as bees, are very rarely seen in the vicinity of female inflorescences.

Although the aniseed smell not unnaturally incites attempts to find a reason for it connected with insect pollination, it is probable that logical examination must go further back.

According to Strasburger, certain characters of the flowers of angiosperms, such as attractive scents and coloured perianths, owe their origin to the occurrence of similar or analogous phenomena in a primitive ancestor at anthesis* only, these characters having been further developed when circumstances arose which proved them to be of value by attracting insects to assist in pollination (6) (7) (8).

It is probable, therefore, that the scent of aniseed from both male and female oil palm flowers is an undeveloped primitive character incidental with increased vitality at anthesis, but not directly concerned with pollination.

The abundance of pollen on male inflorescences is bound to attract a number of insects, especially bees, and those most commonly seen locally, visiting male inflorescences are *Apis indica*, F. the small honey bee, *Melipona laeviceps*, Sm. the small damar bee, and *Apis dorsata*, L. with long abdomen.

The first-named is the most conspicuous, but the second may often be seen in some numbers collecting the oil palm pollen which they carry away on their legs.

These bees do not visit female flowers, nor has the writer seen any winged insects on female inflorescences, though a few have been recorded by entomologists. (9) (10).

Frequently at night, a small moth, *Pyroderces centrophanes* Meyr. (Cosmopterygidae) (11) may be seen in large numbers on and about male inflorescences with freshly opened flowers. They lay their eggs in the pockets left by the extruded anthers, having been attracted to the inflorescences probably by the scent of the fresh pollen.

The only common insect recorded as a visitor to both male and female flowers in Africa is a small weevil (*Derelomus* sp.). Attempts have been made to connect this insect with pollination (1). It is stated that though it chiefly visits male inflorescences, it sometimes lays its eggs in female flowers (12).

Apart from the fact that it is chiefly the male inflorescences that this weevil visits, it is reasonable to assume that any value it may have as a pollinator, would be offset by the damage done in laying its eggs in the female flowers.

While the above observations were being recorded, an examination was also being made of the dispersal of the pollen by wind.

Several methods for measuring the density of pollen in the air were tried, but were found difficult to control, and were abandoned in favour of exposing slides during measured periods of time to obtain, by counts of captured pollen grains, an estimate of the deposition of wind-borne pollen.

The period of flowering on both male and female inflorescences is usually five days, but individual female flowers have been recorded as remaining receptive for three days only.

In order, therefore, to make an estimation of the amount of pollen in the air available for pollination of female flowers, a three-day exposure of slides was made at a fixed point in an oil palm plantation.

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* Anthesis—The opening of the flowers, or flowering, including particularly the receptive period of the female reproductory organs and the ripening of the anthers.

The site chosen was at the base of a low hill facing west, in a small valley running south by west and north by east, and was fairly well exposed to the prevailing winds. A small board was hung as a shelf, on a mature palm, beside a female inflorescence, at a height of 10 feet from the ground.

Male inflorescences were noted on palms at distances of 28 feet and 50 feet; the further inflorescence being in the fourth day of flowering and situated to the south-west of the shelf, while the nearer inflorescence, to the east of the shelf, was just beginning to flower.

Ordinary 3 inch x 1 inch glass slides were used, and the central 2 inches of one side of each slide were coated with a mixture of four parts egg albumen to one part glycerine, spread on with a small paste brush.

Six slides, spaced three inches apart at marked positions on the shelf, were used for each exposure, and the first six slides were placed on the shelf at 11 a.m. on the first day. (21-2-33). Slides were changed each hour for the first eight hours, but exposures were then altered to two-hourly periods, which degenerated into four-hourly periods during the first night.

A table of results shows the amount of pollen collected at each exposure, with accompanying notes on variations of wind by personal observation only, as meteorological instruments were not available. Accurate records of wind and other phenomena would possibly have been more instructive.

Table of Results.

Date.	Hour (Suntime)*	No. of Pollen Grains.	Weather Observations.
21-2-33	11 a.m. to 12 noon	6	Gentle intermittent breezes.
	12 to 1 p.m.	5	
	1—2	1	
	2—3	2	
	3—4	0	
	4—5	12	Breeze stronger and a bit gusty.
	5—6	15	
	6—7	29	
	7—8)		Calm.
	8—9)	102	
	9—10)		
	10—11)	60	
	11—12 Midnight)		Very gentle breeze.
22-2-33	12—1 a.m.)	87	
	1—2)		
	2—3)		
	3—4)		
	4—5)	238	Calm.
	5—6)		
	6—7)		
	7—8)		
	8—9)	40	Gentle breezes.
	9—10)		
	10—11)		

* Official time in Malaya is 20 minutes in advance of sun time.

Date.	Hour (Suntime)	No. of Pollen grains.	Weather Observations.
22-2-33	11—12 noon)		Calm.
	12—1 p.m.)	88	
	1—2)		
	2—3)		
	3—4)		
	4—5)	31	Freshening.
	5—6)		
	6—7)		
	7—8)		
	8—9)	49	Rain.
	9—10)		Very heavy rain. (No exposure of slides).
	10—11)	0	
	11—12 midnight)		Calm.
23-2-33	12—1 a.m.)		
	1—2)		
	2—3)	27	
	3—4)		
	4—5)		
	6—7)		
	6—7)	30	
	7—8)		
	8—9)		
	9—10)		
	10—11)	76	Light gusty breezes.
	11—12 noon)		
	12—1 p.m.)	65	
	1—2)		
	2—3)	18	Very heavy rain. (Slides sheltered from the force of the rain).
	3—4)		
	4—5)		Calm.
	5—6)		
	6—7)	28	
	7—8)		
	8—9)		
	9—10)		
	10—11)	12	Gentle breezes.
	11—12 midnight)		
24-2-33	12—1 a.m.)		
	1—2)		
	2—3)	44	
	3—4)		
	4—5)		
	5—6)		
	6—7)	24	Windless and sultry.
	7—8)		
	8—9)		
	9—10)		
	10—11)	35	Gusty wind.

Wind rose about 11 a.m. on the 21st February as gentle intermittent breezes; was rather stronger and gusty that afternoon between 4 p.m. and 7 p.m. There was just enough to stir the leaves of the palms at about midnight when the near-by male inflorescence was exposing pollen freshly.

There was very little wind during the morning of the 22nd but it freshened at about 5 p.m. and there was rain from 9 to 11 a.m. It was calm during the night but at 9.30 a.m. on the 23rd, light gusty breezes sprang up. There was heavy rain from 1 p.m. to 3 p.m. and the rest of the afternoon was calm. At 11 o'clock that night, very gentle breezes arose again, but died away altogether towards the morning which was windless and sultry. There was a little more gusty wind at 10.30 a.m.

The average deposition of pollen is here shown to be 15.6 grains per 12 square inches per hour, or a little over one grain per square inch per hour. In other words, 94 grains per square inch were deposited in three days and this illustrates the quantity of pollen available for pollination over the period for which the female flowers are usually receptive.

The greatest amount of pollen was deposited from 1 a.m. to 5 a.m. on the 22nd February, but on one of the six slides a total of 172 grains was counted, most of which was in groups of from six to twenty grains. It occurred in a period of calm following some wind disturbance and may, therefore, need no other explanation, especially as this also coincided with the full flowering of a nearby male inflorescence; but as the other slides showed only 19, 2, 9, 12 and 24 grains respectively, it is possible that a bee, with pollen on its legs after visiting a male inflorescence, had in some accidental manner stumbled on to this slide.

This slide alone, however, does not affect the general conclusion, for though its elimination from the total count would reduce the average from 94 to 79 per square inch for three days, there is little practical difference between these figures.

This first experiment was conducted in February 1933 in the small area of oil palms in the Kuala Lumpur plantations and at the time the palms had few male inflorescences in flower.

Subsequently, similar series of exposures of slides were made in the much larger area at the Central Experiment Station, Serdang, during November 1933, and in a large estate during July, 1933.

On both these occasions an anemometer was used and was fixed near the crown of the palm on a level with the inflorescences and the tray of slides. In this position, however, it measured only the amount of wind in very localised eddies and was a poor index of the actual wind. A second anemometer up above the tops of the palms would have been necessary for accurate wind records.

Slides were exposed as described for the experiment in Kuala Lumpur, except that the mixure of egg albumen and glycerine was altered to three parts glycerine to two parts egg albumen, and was spread on the slide more thinly.

Furthermore, as it was decided that three hours was the most suitable period for successive exposures of slides, this period was adhered to throughout both these later experiments.

The estate in question covers an extensive area of undulating land and is, for the most part, well exposed to winds from any direction.

The site chosen for the experiment was on the western side of a hill in the centre of the estate, typical of the conditions of the estate.

The first six slides were exposed at 2 p.m. on the 5th July, 1933, and a fresh batch of slides was exposed every three hours up to and including 11 a.m. on the 8th July.

Male inflorescences which were in various stages of flowering from just commencing to almost over, were noted on palms at the following distances from the palm on which the slides were hung:—36 feet S.E., 225 feet W by N., 150 feet S.S.E., 130 feet E. by N., 100 feet N., 75 feet N. by E., and 35 feet N.E.

The "counts" of pollen obtained are as follows:—

Date.	Hour (Suntime)	No. of Pollen grains. (On 12 square inches.)	Humidity. per cent.	Temp. °F.	Weather Observations.
5-7-33	2 p.m.	—	72	85.2	Fresh breeze.
	5 „	190	73	84.0	Light shower of rain.
	8 „	63	95	77.1	Gentle breezes.
	11 „	45	99	75.3	Calm.
6-7-33	2 a.m.	38	95	75.0	Gusty wind.
	5 „	206	98	74.0	Calm.
	8 „	59	91	77.0	„
	11 „	20	70	85.6	„
	2 p.m.	18	69	87.2	Gentle breezes.
	5 „	18	82	83.8	Calm.
	8 „	104	93	77.1	Dead calm.
	11 „	59	97	73.8	„ „
7-7-33	2 a.m.	126	98	71.5	Heavy mist.
	5 „	14	98	71.5	Gentle breeze.
	8 „	2	89	77.8	Fresh breezes.
	11 „	94	66	86.5	Fresh breezes, rain.
	2 p.m.	65	69	89.0	Strong wind.
	5 „	90	84	80.2	Fresh breezes.
	8 „	628	95	75.2	Heavy mist, shower.
	11 „	44	98	73.7	Calm.
8-7-33	2 a.m.	7	99	72.9	Faint breeze.
	5 „	29	98	73.0	Foggy.
	8 „	27	92	76.7	Calm.
	11 „	5	75	84.5	Wind freshening.
	2 p.m.	53	92	76.3	Wind strong; heavy rain just commencing.
	72 hours.	2004 grains per 12 sq. inches.			

This shows an average deposit of pollen of 167 grains per square inch in three days, and indicates that there is probably a very great deal of wind-borne pollen throughout the estate.

It was originally planned that the further series of exposures of slides should be made at the Central Experimental Station, Serdang, during the same month, but unexpected pressure of work in another direction prevented this, and suitable opportunity was not found until the following November.

The oil palm area at Serdang is situated in the north west corner of the Experiment Station, very largely on the sides of ravines and slopes facing towards the south east and sheltered a good deal on the north west by its own disposition and by an extensive area of hilly jungle along the western boundary of the Experiment Station.

The site chosen was in the centre of the area devoted to experiments in artificial pollination, on the side of a small hill facing towards the east.

The first six slides were put out at 2 p.m. an the 20th November, 1933, and changed at intervals of three hours up to and including 11 a.m. on the 23rd.

Male inflorescences in various stages of flowering were noted on palms at the following distances from the palm on which the slides were hung :— 30 feet W.N.W., 100 feet N, 110 feet E, 140 feet N.N.E., 190 feet N.N.E., 215 feet N.N.W., 170 feet N.N.W., 195 feet S, 140 feet S.W., 200 feet W.S.W., 195 feet N.N.E., 170 feet N.N.E. and 110 feet N.

The "counts" of pollen obtained are as follows :—

Date.	Hour (Suntime)	No. of Pollen grains. (On 12 square inches.)	Humidity. per cent.	Temp. °F.	Weather Observations.
20-11-33	2 p.m.	—	74	86.5	Air faintly stirring.
	5 „	18	83	82.2	Wind freshening.
	8 „	233	93	75.0	Light showers of rain.
	11 „	88	99	74.2	Gentle rain.
21-11-33	2 a.m.	34	97	73.5	Fine and calm.
	5 „	40	97	72.8	Dead calm.
	8 „	8	95	74.0	Gentle breezes.
	11 „	40	75	83.8	Fine and bright.
	2 p.m.	68	78	83.5	Air almost still again.
	5 „	3	87	80.4	Gusty breezes.
	8 „	82	95	77.0	Dead calm.
	11 „	249	97	74.1	Light mist.
22-11-33	2 a.m.	108	97	73.5	Calm.
	5 „	8	98	72.8	Faint breeze.
	8 „	6	91	76.4	Just freshening.
	11 „	3	71	84.8	Gentle breezes.
	2 p.m.	8	66	86.5	„ „
	5 „	147	93	78.0	„ „
	8 „	62	97	73.5	Fairly heavy rain.
	11 „	26	100	72.3	Rain just over.
23-11-33	2 a.m.	38	99	72.5	Calm.
	5 „	2	99	72.5	Very gentle breezes.
	8 „	3	90	75.8	
	11 „	25	80	81.7	
	2 p.m.	6	81	79.5	Gusty wind.
	72 hours.	1305 grains per 12 sq. inches.			

This shows an average deposit of pollen of 109 grains per square inch in three days, which is an indication that a considerable amount of pollen is distributed by wind, and although the count is much lower than that obtained in the estate experiment, it would give the impression that there is adequate wind-borne pollen available for pollination of female inflorescences.

It is not intended to compare the results of these two single experiments at different times of the year, but it may be observed, that apart from the much higher total count obtained on the estate, which is largely accounted for by 628 grains for the period from 5 to 8 p.m. on the 7th July, 1933, the deposition of pollen was a good deal more evenly distributed than at Serdang.

This coincides with observations on the incidence of wind on each occasion for, on the estate, the wind, though generally of less strength, came in steadier gusts than at Serdang, where it reached the oil palm plantation in sudden gusty swirls.

Conclusions.

The results of these observations and experiments show that oil palms are, for all practical purposes, entirely wind-pollinated, and that although pollination by insects is not impossible, it is probably largely accidental and is never likely to be significant.

These experiments also give one reason to believe that, in estates and large plantations of average palms, particularly those in which the palms are sufficiently well exposed to prevailing winds, naturally wind-borne pollen is likely to provide the optimum pollination of female flowers.

The effects of artificial pollination on young palms require further study.

On account of its short stem, the dense crown of leaves typical of a young oil-palm forms an effective screen against wind-borne pollen, as a result of which its female inflorescences are but lightly pollinated.

Artificial pollination considerably increases the yields of fruit from young palms, (13) (14) (15) but there is some evidence to show that such assistance to fruit production in young palms may adversely affect their mature yields. (16) (17) (18). It is possible that the screen of leaves on a young palm acts as a natural protection against over-pollination.

The requirements of stands of specially selected palms and the possibilities in conjunction with manuring and cultivation have also to be examined more fully.

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WEEKLY FAIRS IN KEDAH

BY

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It is only logical that in any country the indigenous population should have some interest in the business which goes on in it; yet in Malaya an outsider on his first arrival would be greatly struck by the peculiar conditions which he meets. Almost all branches of business in the towns, from the management of the firms down to the insignificant odd jobs, are in the hands of people not of Malay blood. In short, there are indeed very few local business undertakings in which the Malays have any share.

The Malays and Commercial Development.

The process of dispersion of Malays from the settlement begins when it is still a village. As soon as a village attains sufficient importance to attract people of other races to start business, the Malays, instead of assisting in the work of betterment and uplift of local conditions, withdraw to quieter places where they can settle. In doing so they have often to start afresh by reclaiming or bringing under cultivation new areas of swamp or jungle.

It would be reasonable to suppose that the Malays would have been the first to profit by the rise of a village and the increased value of the land which they owned, and to have taken advantage of the situation by building a shop, or two, on their land and setting up their own businesses. The reason why they do not do this is obvious; they have no business training and cannot hope to compete with the new-comers, many of whom already possess commerical experience.

Many of these immigrants have business connexions elsewhere in Malaya as well as in their own countries, so that they are better able to arrange for the importation of foreign articles which are in local demand. Further, many of these people have experienced hardship and poverty in their own countries and have been trained to run their businesses along economical and profitable lines.

In their gradual retreat from the towns the Malays have brought under cultivation more and more areas of jungle and swamp. They have planted fruit and other useful trees in the former and wet-rice in the latter. On their return to the land they can find sufficient means to support themselves and their families; it is only when they have surplus quantities of produce that they find themselves faced with a problem.

It is evident that home industries are threatened with total extinction unless means can be found to stimulate production. At one time even the clothes which a Malay wore and several other articles which he carried about with him

were manufactured locally. Today many of the former home-made goods are not to be found, or are difficult to obtain.

As in many other countries, it would be almost a practical impossibility to try and revive home industries on a commercial scale against such heavy odds as the Malays are now facing in the shape of cheap machine-made articles.

With limited markets and in isolated units, Malay commercial enterprise is liable to fall an easy prey to other business bodies. In addition, the Malays have a curious desultory and spasmodic habit of conducting their businesses compared with the more tenacious and laborious methods of immigrant races. They may also change from one business to another, when they observe, or even imagine, that there is appreciably more profit to be gained by the latter and they seldom if ever stop to think of the consequences of over-production. An example of this was found at one fair, when on one occasion fourteen animals were killed for sale, where the average demand was six animals per week.

There is still a great deal to be done to avoid undue local competition and uneven distribution of produce, as the law of supply and demand is not properly understood by the people. At the same time, it would be against all the principles of the present movement to discourage local production where it is possible to arrange for supplies to be distributed evenly over a wider field.

The Work of the Weekly Fairs Committee.

The marketing of surplus production is one of the problems which is engaging the attention of the Weekly Fairs Committee appointed in 1932. This is a small official committee whose duties are to organise, manage and supervise weekly fairs throughout the State of Kedah.

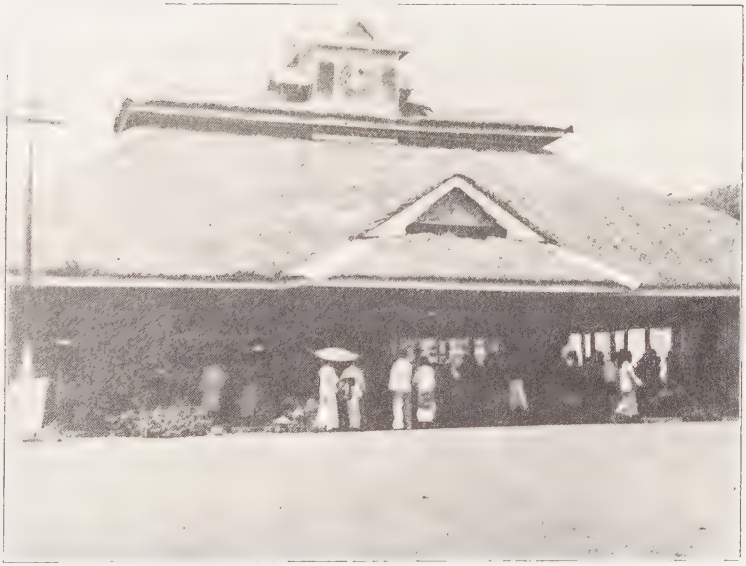
Weekly fairs were started about ten years ago but, mainly through lack of organisation, they enjoyed no long success. The three fairs which survived were taken over by the Committee, many old fairs were revived and new ones opened. All are conducted on a uniform system.

Although the power vested in the Committee is as stated above, it is chiefly concerned with general organisation and management. It fixes rules and regulations in regard to locality and sites, days on which fairs are to be held, conditions of sale, slaughter of animals for meat, designs of the buildings, charges for stalls, the allotment of the reserve funds, auditing of accounts kept at each centre, and the organisation of animal shows and the weekly fair at Alor Star.

Organisation of the Fair.

The cost of the building of each of the fairs in Kedah, except the main central fair at Alor Star, is financed by one or more persons who reside in the locality in which the fair is situated. If the construction is undertaken by one man he is free to run the fair in any way he prefers as regards the funds allotted to him, but he is still bound by the rules which apply to weekly collections from persons using the fair.

A Weekly Fair Direction Post in Kedah.



The Weekly Fair at Alor Star, Kedah.

The sites generally approved for the fairs are accessible by road, river, or by sea. Wherever possible, Government land is selected, but often in important localities, Government land is unobtainable, so that privately-owned land is rented on agreement for as long a term of years as possible.

Sometimes the fairs are located in the interior mukims approachable only by foot-paths. In these cases, the sites chosen are the first points touched by the peasants on reaching a main road, or cross-roads, for if the peasants have to pass a wayside shop, or shops, before reaching a fair, the articles they bring may be sold en route.

Near a big town the site chosen is often between the village with the biggest agricultural population and the town. This is essential to prevent the peasants from being intercepted by tradesmen and the produce sold at a smaller price than would have been obtained at the fair.

The days on which the fairs are to be held are fixed by the Committee and are arranged so that any two fairs taking place on the same day are far enough apart to avoid clashing. The shortest distance apart at which two fairs could be economically held on the same days is 10 to 12 miles.

An interval of two or more days is considered necessary for the holding of two closely connected fairs in order to give time to the sellers to collect materials for each.

It has been found necessary to regulate the sale of produce in the fairs in order to eliminate undue competition. This may appear to be an unprogressive course. At the present stage of development the whole organisation depends for its success on a certain amount of protection. The Malays, as has already been shewn, are still in the transition stage of business training and any discouragement due to unregulated competition would completely upset the objects of the scheme which the Committee has set itself to work out.

Among the articles for sale at most fairs are rice, cakes, ghee, wild honey, fruits and vegetables in season, agricultural implements, domestic goods and wild animals. There are about fifteen different articles of which the Malays have an absolute monopoly of sale at the fairs.

Owing to the excessive number of animals slaughtered and the consequent lowering of prices of meat, it has been found necessary to regulate the number of animals to be slaughtered at each fair. In this connexion the Committee has laid down regulations regarding slaughtering, which include supervision of slaughter, number of cattle to be slaughtered—decided by priority of applications—and inspection of animals before slaughter. Only persons residing in the vicinity of a fair are allowed to slaughter animals for sale at that fair.

Designs of the buildings vary slightly in different places according to the amount of capital and materials available, but on the whole the main buildings are constructed in very much the same manner. They are long and spacious sheds having double-span roofs, with a wide space between the first and the second roof to provide ventilation, and supported on high posts.

The stalls within are in rows, one along each side and one through the middle, and extend from end to end of the building. The gangways are sufficiently wide to enable a fairly large number of people to transact their business comfortably, or take shelter in rainy weather.

Other buildings consist of one large shed for women-sellers of vegetables, fruits, cakes, etc., and several small separate sheds and stalls, where ice, sherbert, coffee and food of the usual kinds common to the Peninsula are sold.

Charges up to thirty cents per person are imposed at each fair on all those who come to sell. Articles valued at less than 50 cents are allowed to be sold free of charge by both sexes, and articles up to $1 are allowed to be sold free of charge if they are brought for sale by women.

Capital.—The share-capital for the erection of the buildings at the fairs is collected among the local Malays. These people often supply all the building materials, such as timber and attaps, and construct the buildings themselves. The buildings are then assessed according to the value of the various materials used and the amount of labour employed.

Reserve Funds.—Out of the total weekly collection, the Committee insists on a certain percentage being set aside as a reserve fund for the purpose of meeting possible liabilities. The remainder, after deducting all expenses, is declared as a dividend and paid to the shareholders.

Accounts and Audit.—The account books of the fairs, which are in the Arabic character, are kept on a uniform system as approved by the Registrar of Co-operative Societies, who is for the time being, the auditor.

Organisation of Annual Shows and the Weekly Fair in Alor Star.

The first annual show was held in Alor Star in April 1933 and was considered a great success. Owing to financial considerations no show was held in 1934 though it is hoped to arrange for another show to take place at Sungei Patani in the near future.

The Weekly Fair at Tanjong Charlie, Alor Star.

The Tanjong Charlie Fair is maintained by the Government and is under the direct supervision of the Committee.

The fair is assisted by the Penghulu of Kota Star, a caretaker and four assistants who are engaged for the number of days the fair is held in each month.

The primary object was to ascertain how a fair consisting mostly of Malay business men and women would succeed in the town and how they would succeed in competition with the business population.

The Committee held out so little hope of success that it would not even countenance the idea of spending any money on the construction of a shed. What little shelter was available was supplied by an abandoned cattle quarantine shed which was barely sufficient to give protection for more than three lorry-loads of vegetables and fruits.

After two or three weeks' trial, the Committee felt convinced that the fair would succeed and a temporary attap roof was hurriedly constructed to cover the open quarantine yard.

From this time onwards the fair gradually increased in size and importance till it reached its present magnitude. Now, more than seventy bus-loads of fruit, vegetables and other produce come to the fair every Wednesday. In addition, there are a number of sellers who come on bicycles, in motor-cars, or boats and on foot. The turnover, per week, averages about $1,800.

The weely attendance, at a moderate estimate, is between 2,000 and 2,500, and the number of people who come to sell is about 400.

At this fair, only Malays are allowed to sell and, even with this strict condition, the buildings are not large enough for the requirements.

The Tanjong Charlie Fair, or Pekan Rabu, as it is generally known, is intended to be a training centre for other weekly-fairs. The Malays there are taught the use of scales, the use of weights and measures, proper arrangement and display of their merchandise in a manner attractive to the customer. Strict rules are enforced to ensure cleanliness of the buildings and of the articles brought for sale. There is also ample opportunity for new arrivals to learn to sell things at a profit and in a business-like manner.

It may be added that the chief business deficiency among the Malay peasants is their inability to make simple mental calculations and to determine the face-values of most articles they sell; in very many cases the articles are under-valued.

Permanent stall-holders at this fair include sellers of spices, fruits and vegetables, cigarettes and tobacco, Malay medicine, carpentry, pottery, preserves and padi-planting implements. Other stall-holders include a watch repairer, a bookseller, in addition to several eating shops.

General Work of the Committee.

Additional activities of the Committee are mainly concerned with propaganda, with the object of increasing the popularity of the fairs, by lectures, erection of sign posts, advertising fairs by posters and pamphlets and demonstration of methods of cultivation of vegetables.

In lecturing to the people the Chairman often speaks on suitable agricultural subjects with special reference to the work of the weekly fairs; the Registrar of Co-operative Societies lectures chiefly on economic subjects.

Sign-boards are placed at all suitable places, such as the junctions of roads and at the central weekly fair at Tanjong Charlie; at this fair a large board over 20 feet high bears a complete list of the weekly fairs established in the State. Sign-boards giving the names of the fairs, and the days of the week on which they are held, are placed at the sides of the roads a few hundred feet from all approaches to the fairs. The descriptions given are in three languages, namely, Malay, Chinese and Hindustani. On the top of each board is mounted a traffic danger signal.

Advertisement posters are circulated to all the fairs when there is any occasion for doing so. Circulars, with an up-to-date list of all the fairs, are printed and distributed free to the people from time to time.

Owing to general illiteracy, especially among the female peasant population, the Committee considers it advisable to use a distinguishing sign by which the fairs can be easily recognised. The design adopted is in the form of a crest, which bears a "tajak" and a "changkol", surrounded by a wreath representing "sireh" leaves. The weekly fair sign is mounted over all flag-posts and sign-boards.

Demonstration plots are attached to the big fairs where possible; the idea is to demonstrate to the people the best methods of cultivating different useful vegetables and money-crops.

By means of the weekly fairs the produce of the soil can be evenly and profitably spread over all parts of the State and sold either directly by the owners themselves at the fairs or indirectly through the Malay middlemen.

It is greatly to be hoped that when the fact is fully realised by the Malays that they are much behind other races in commerce and industry, it may lead them to the revival of these important branches of occupation in which they once took a prominent part. The number of fairs in the State, the attendance and the business turnover, give a clear indication of the business instinct awakening among them.

Extent of Progress.

The fact that there are now forty-two fairs in operation is an indication that they have become very much part of the life of the people. The average turnover per week is about $12,000. During the fruit season the turnover is larger, but this only lasts for about three or four months in the year. The total number of people who come to sell is about 3,000 per week. A fair percentage of these have taken up the business permanently, others are part-time sellers and those who wish to make the best use of their time between padi seasons.

The attendance, per week, at all the fairs is about 21,000. Of the total number of people attending, more than three-fourths are Malays. The fairs have come to be regarded by the Malays not only as places in which business is transacted, but also as meeting places. In North Kedah, people living within a radius of 10 miles gladly come to the fairs on foot with things for sale. At the fairs various topics bearing on local problems are freely discussed with officials and others.

Opportunities have been taken by Government officials to distribute medicine, to sell properties by public auction, to advertise shows, to display posters conveying useful information in relation to food and hygiene, and to announce by means of notices the latest developments in Government policy affecting the people.

The advantages derived from these fairs can be seen in many directions. More and more immigrant races have left and a large number of Malays have

come forward to do the work themselves; an improved market has been found for many products; fruit growing has gained in popularity; and passenger traffic has increased.

While there may be other advantages gained by the establishment of weekly fairs, the final aim in establishing them, as previously mentioned, is to teach the Malay people the importance of trade and industry. Some may lose money in the beginning, but such losses should not be large enough to discourage them, because the business only entails the investment of small capital. A loss, on the other hand, would serve to teach them to be careful, thrifty and more business-like. Success, however, would serve to eradicate the deep-seated conservatism respecting shop-keeping industry and commerce.

The fairs have received much assistance from many Government Departments. On the other hand, these events have been made use of by Government and have greatly facilitated the collection of taxes.

Summary and Conclusions.

In a little over two years, weekly fairs in Kedah have increased from three to forty-two. This has been achieved through the Committee appointed to organise this work. This Committee has regulated the whole conduct of the fairs, but has allowed the control to rest with those who finance the ventures.

The conclusion is reached that where the Malay population is in the majority and where padi fields, fruit orchards and Malay homesteads are large and numerous, weekly fairs are a natural and essential adjunct as they form centres in which the Malays can sell their surplus produce and buy in return, at reasonable prices, articles for their home needs.

In places in the southern districts, where there are fewer Malays in proportion to other nationalities, fairs are not of the same importance as they are in the north. In spite of this fact, fairs have become permanently and successfully established.

It is most encouraging to note that there is at present every indication of gradual business and commercial awakening among the Malays. The consciousness of the fact that they are at present far behind other people in this direction may be instrumental in bringing about a general revival of trade and commerce among them.

Acknowledgment.

The writer is much indebted to Mr. W. N. Sands, the Principal Agricultural Officer, Kedah, for his kind help and criticism in the preparation of this article.

MALAYA AT THE CANADIAN NATIONAL EXHIBITION, TORONTO, 1934.*

This year marked the Centenary of the City of Toronto, for which reason the Exhibition was more widely advertised and had many special features and attractions. The attendance shewed an increase of about 88,000 over last year's figures.

The Malayan stand, in a commanding position, occupied 640 square feet as compared with 384 square feet in the previous year. The main portion of the stand was devoted exclusively to pineapple propaganda, the chief purpose of Malaya's participation, but one end was set apart for tourist propaganda.

Pineapple cookery demonstrations were given thrice daily and attracted eager audiences. Considerable attention to the Malayan stand was given by the Press. In addition, the Publicity Officer delivered two National broadcasts on Malaya, in each of which reference was made to the pineapple exhibits and demonstrations at the Exhibition.

The Malayan exhibits impressed upon the public that the Malayan canned pineapple represents the highest value for money on the Canadian fruit market. A still more important service which it was able to perform, however, was that of introducing for the first time "Choice" quality Malayan pineapple to the Canadian public. It should be mentioned that in Canada, "Choice" denotes what in England is known as "Golden" quality, the Canadian equivalent for G.A.Q. (Good Average Quality) being known as "Standard". Until now, Malayan pineapple has only been known in the "Standard" quality, selling at an average price of 10 cents gold in the stores, as compared with 20 to 25 cents gold per can obtainable for the Australian and South African brands and for Cuban pines packed in Canada. The Malayan stand was mainly instrumental in getting this new Malayan quality firmly established.

"Standard" quality Malayan canned pineapple is entirely a price proposition on the Canadian market. That is to say, it holds its enviable position simply because it is cheap, and until recently, there has been little attempt made to extol it as having any particular merits in point of quality. Now that the quality has definitely improved under the stricter supervision introduced, there is a tendency to advertise it as a good quality article at a cheap price. Nevertheless, under present conditions it must still be considered as commanding its market simply because it falls within reach of the less affluent classes. Indeed, its very cheapness operates against it in the minds of many housewives able to afford the Australian or South African article; they refuse to buy Malayan pineapple simply because they cannot believe that the contents of a 10 cents can could possibly be up to the mark.

Palm Oil.

A small exhibit of Malayan palm oil products was displayed on the stand. It aroused considerable interest, and led to the introduction of this product to at least one important firm who wish to develop the trade in Canada.

* The following is abridged from the report of the Publicity Officer from the Malayan Information Agency, London, who was in charge of the Malayan Stand at the Exhibition.

Reviews.

Malayan Agricultural Statistics 1933.

By D. H. Grist. Special Bulletin, Economic Series No. 5, Department of Agriculture, S.S. and F.M.S. 1934. Price 50 cents (Straits Currency).

This is a compilation of statistics, drawn from various sources, concerning Malayan agriculture in the year 1933. It includes import and export figures for some years past of agricultural products which might be grown locally, areas and production of the principal agricultural crops, market prices in 1933 and meteorological data.

The present is the third year of publication of this annual statistical summary. Its scope has been widened with each successive issue; the first contained 63 tables, whereas the present number has 82 tables, two graphs and a comprehensive index.

Notes on Hymenopterous Parasites of Padi Pests in Malaya.

By H. T. Pagden. Special Bulletin, Scientific Series No. 15, Department of Agriculture, Straits Settlements and Federated Malay States, 1934. Price 50 cents (Straits Currency).

In this paper, Mr. H. T. Pagden, formerly Assistant Entomologist, Department of Agriculture, S. S. and F.M.S., records two Dryinids, *Pseudozonatopus hospes* Perk. and *Haplogonatopus* sp. near *americanus*, a Mymarid, *Paranagrus optabilis* Perk. and a Trichogrammid, *Oligosita* sp. as parasites of *Sogata furcifera* Horv. He describes the method of attack of the two Dryinids and gives notes as to the stage of host attacked, frequency of attack and parthenogenesis which in these species "appears to be the rule rather than the exception". He also records three hyperparasites from the cocoons of both the species of Dryinids. With regard to *Paranagrus optabilis* Perk. and *Oligosita* sp., he experienced considerable difficulty in determining their true host but finally established them to be parasites of the eggs of *Sogata furcifera*. In addition to the above mentioned, an unidentified parasite from the pupa and five egg parasites of *Schœnobius* are recorded, and one, *Phanurus beneficiens* Zehnt. he discusses in some detail. The development of its larva is described and illustrated and he suggests that the mandible-like appendages which Berlese calls antennae are of use to the larva in destroying possible competitors, since "if an egg of *Schœnobius* or *Diatræa* is exposed to attack by *Trichogramma* and later exposed to *Phanurus*, it is always the *Phanurus* which survives". Of the parasites mentioned in this paper, *Phanurus beneficiens* Zehnt. is considered the most important of *Schœnobius*, and *Paranagrus optabilis* Perk. of *Sogata*.

Mr. H. T. Pagden, who has been seconded for service in the Solomon Islands, was only able to make "random observations" on these insects, since his work in Malaya particularly concerned the control of lepidopterous stem borers of padi by means of the mass production of *Trichogramma japonica* Ashm. Nevertheless, these random observations are of decided interest and a useful contribution to the literature of the hymenopterous parasites of *Sogata* and *Schœnobius*.

G. H. C.

DISTRICT AGRICULTURAL SHOW.

Kuang, Selangor.

The second show at this centre was held at the Malay School on 4th November 1934. It was opened by the Hon'ble the British Resident, Selangor.

The number of exhibits in most classes was very satisfactory, though in many instances the quality left much to be desired.

Educationally, the event was a success. Exhibitors were able to see the improvements which they can make in preparing their agricultural products for market. Demonstrations were held and special exhibits staged by Government Departments which had for their purpose the improvement of hygiene in the villages, the housing and feeding of poultry, the preparation of improved rubber, and the advantages of co-operation in agriculture.

A baby show was held at which a demonstration in midwifery was given; nursing and feeding the child were also demonstrated.

ERRATA.

Experiments on the Cultivation and Manuring of Coconuts.

(*Malayan Agricultural Journal* Vol. XXII, No. 11, 1934).

Table IV.

Estate A.

1932	Nuts per palm	*read* cover buried	...	47.0
		clean weeded and cultivated	...	48.8
		clean weeded only	...	48.8

Estate E.

1933	Nuts per palm	*read* cover buried	...	64.8
		clean weeded and cultivated	...	76.8
		clean weeded only	...	75.0
		L N P K	...	75.0

Estate F.

First half 1934	Nuts per palm	*read* cover slashed	...	22.4

Estate G.

First half 1934	Percentage	*read* clean weeded only	...	112.1

Table V.

Estate B.

	Nuts per palm	*read* cover buried	...	6.5
		clean weeded and cultivated	...	11.1
		clean weeded only	...	10.4

Estate D.

	Pounds per palm	*read* clean weeded	...	33.5

Estate E.

	Pounds per palm	*read* L N P K	...	40.5

Estate F.

	No. of nuts percentage	*read* N P K	...	100.3

Estate G.

	Nuts per palm	*read* control	...	13.5

Table VI.

1931	Nuts per palm	*read* control cover slashed	...	9.4
		clean weeded	...	17.1
First half 1934		*read* lime, cover slashed percentage	...	49.3

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

With the exception of parts of Kedah, where heavy rains early in the month gave way to hot dry conditions, the central areas of Perak and Negri Sembilan, the inland and south coastal districts of Selangor, and the central districts of Johore, where conditions were very dry, average precipitations were recorded. Appreciable flood damage was reported from Kedah and the riverine mukims of Lower Perak, while minor flooding occurred in practically all districts in Province Wellesley North and Penang, and to a lesser degree in the coastal and southern districts of Pahang.

Remarks on Crops.

Rubber.—A general price decline has been reported from all centres. In Kelantan the discrimination is mainly against the better qualities, and increased attention is therefore being given to the manufacture of lump.

Excessive rains which were general throughout the Peninsula appreciably restricted production by limiting the operations of tapping and collection. Inundation of holdings has been reported from the northern areas of Perak, and the west coastal areas of Johore.

Favourable conditions have assisted the distribution and spread of mouldy rot disease. The departmental sales of approved fungicides have been maintained, and an endeavour to stimulate voluntary control in centres where the disease has become virulent has been made by staging demonstrations of approved methods of treatment. There is, unfortunately, a strong feeling among a large body of small-holders that heavy rains neutralise the effect of fungicides.

Improvements in the general upkeep of small holdings continue to be maintained, and in many cases the manufacture of better quality rubber is reported. These improvements are due, in a large measure, to the instructional work carried out by the officers of the Small-holders' Advisory Service.

Padi.—Planting in the Krian Irrigation area this season is computed at approximately 48,397 acres as compared with 49,060 for the previous season. Flowering has commenced in several centres and the gradual withdrawal of water supplies from fields is expected to commence early in December. Insect pests have caused but slight damage, while depredations by rats—although on the increase during the period under review—have been of no particular consequence. It is reported that an increased measure of control has been general throughout the district. Crop prospects generally are very good.

Crop destruction due to flood damage in Kedah is estimated at about 2,840 acres, Kubang Pasir and Kota Star Districts being principally affected. The

Muda river broke through the bund at Pekula and submerged a large area of crop and destroyed approximately 248 acres. Lesser floodings were also reported from Province Wellesley North, and in the coastal and southern areas of Pahang. In the riverine mukims of Lower Perak District, many of the areas under cultivation were submerged continuously for some three weeks.

Harvesting has commenced in the Jelebu and Kuala Pilah Districts of Negri Sembilan, and in the riverine and coastal mukims of Pahang and parts of Selangor. The irregularity of planting has resulted in considerable bird damage.

In the newly-opened areas of Sungei Manik, Perak, planting has been continued and good growth has been reported in the earlier planted centres. At Panchang Bedina in Selangor, water supplies are now adequate but planting material is limited, due to earlier water shortage, and pest damage in nurseries.

In Kelantan, planting is practically completed and the crop is making good progress. The dry padi crop did not recover from the set-back experienced in the early stages of growth and yields will suffer in consequence.

Coconuts and Copra.—A smaller demand for fresh nuts in the Burma markets declined the nut price to $13 per thousand. The competition by middlemen in this trade continues to be keen.

The copra produced on the improved kiln at Sri Menanti, Johore, is now being sold locally at a satisfactory price. The second improved kiln erected at Ringgit, Batu Pahat, was opened during the month and commenced operations. Arrangements are in hand for the erection of kilns of similar type at Serkat and Ayer Baloi.

In Perak South, the kiln at Sungei Nipah commenced working and produced good quality copra which obtained a satisfactory price. Another small-holders' kiln at Sungei Balai is preparing to restart with a view to producing good quality dry copra. Advisory visits to a number of other kilns with the object of effecting improvements have been maintained.

Patchouli.—With an increase in price for dried leaves, attention has been paid to the harvesting of areas which have been in a state of abandonment for some considerable time in the Segamat District of Johore.

Pineapples.—Prevailing weather conditions appear to be responsible for retarding the ripening of fruit which is very scarce in Johore and Singapore. In the former State, four factories commenced operations during the month but closed down owing to short supplies.

Agricultural Stations.

The demonstration plot for Sakai at Anak Ayer Denak in Perak has been cleared and fenced. The planting of fruit trees will be undertaken as soon as supplies are available.

On most stations tea pruning has been completed and the bushes dressed with the standard pruning mixture. Owing to the incidence of this operation

the yield of made tea at the Experimental Station, Tanah Rata, declined to 1651 pounds during the month.

Further progress with the development of stations in Labuan and Brunei has been reported.

Padi Stations and Test Plots.

At Telok Chengai Experiment Station and the four test stations in Kedah, very satisfactory progress has been made by the crop which has completely recovered from the severe flooding previously experienced. A number of the earlier strains have commenced to flower and an excellent harvest is anticipated.

At Titi Serong Experiment Station and the mukim test plots in Krian, conditions are equally satisfactory. Water supplies are adequate and pest damage only slight.

At the new Sungei Manik Station developmental work is making progress and it is anticipated that stumping and burning will be completed by the end of the year. Severe flooding has necessitated arrangements for raising earthworks three feet above ground level to accommodate with safety the store and quarters.

At Talang, the Hong Kong variety Lam Shum Tsim was harvested during the month; a considerable loss of grain was suffered due to bird damage. The Sze Min variety is now nearing maturity: it has a longer maturation period, and would appear to be a heavier yielder than the former. The ripening in both cases is very uneven.

Of the newly opened plots in the Panchang Bedina area, flooding delayed transplanting at Tanjong Karang where seedlings were destroyed. At Panchang Bedina nurseries were successively destroyed by mole crickets during the early part of the season when conditions were dry, and later by floods. The third sowing is apparently successful. Cultivation and transplanting is in progress at Sungei Haji Durani where the Pentatomid bug *Scotinophara coarctata* and leaf-eating caterpillars did serious damage to nursery seedlings.

Bee-Keeping.

A supply of bee-keeping accessories was imported and hives of the small native bee (*Apis indica*) installed at departmental headquarters in Kedah, for observation and instructional purposes.

Mushroom Cultivation.

An edible fungus, which appears to be identical with the padi straw mushroom cultivated in China, the Netherlands Indies and Province Wellesley and described in the *Malayan Agricultural Journal*, Vol. XXII, No. 1, January 1931, was found to occur naturally in Kedah on heaps of padi straw following the prolonged rains of the past few months.

Poultry.

An outbreak of disease reported from Matang Gerdu, Briah, in Perak, towards the end of the month was promptly investigated by the Veterinary Inspector. The outbreak, which was thought to be Diptheritic-stomotopharyngitis was confined to one flock only. Material for examination was despatched to the veterinary authorities and the Institute for Medical Research.

Outbreaks were also reported from the Lipis District of Pahang, and the Pontian, Endau and Kukup Districts of Johore.

Models of poultry houses and accessories have been received in all centres. These will serve for demonstration purposes in conjunction with itinerant lectures on poultry management.

Rice Mill Temerloh.

The mill buildings and machinery assembly are nearing completion, and it is expected that trial operations will be undertaken early in December.

The District Officer, Temerloh, the State Agricultural Officer, Pahang, and the Malay Agricultural Assistant, Pahang South, paid a visit to the Government Rice Mill, Bagan Serai, during the month to observe the methods of large-scale milling.

School, Home Garden, and Kampong Competitions.

The second preliminary judging of school gardens in Krian and Selama, Perak was carried out during the month and the final judging will be completed before the commencement of Mohamedan fasting month, early in December.

The final judging of school gardens in Pahang East was completed during the month, the standard attained being very satisfactory.

There has been a wide response to the home garden competition now being held in the Selama sub-district, Perak. Many scholars, particularly in Tebing Tinggi and Ijok have entered. The first judging is now in progress.

In Pahang, judging in kampong and home garden competitions is practically completed. The standard is reported to be higher than that of the previous year. In the Pekan District 57 gardens competed, the prize being won by a Kuala Pahang entrant who obtained 90 per cent. of the total marks.

District Padi Competition.

The first competition of this kind to be held at Batu Pahat, Johore, took place on November 15th: 269 samples were entered, the best five being retained for participation in a State Competition where selections will be made to represent the State in the All-Malayan Competition, held in conjunction with the Malayan Exhibition in 1935. Requirements for show standards were explained and demonstrated.

Agricultural Shows.

The second Mukim Agricultural Show was held at the Malay vernacular school, Kuang, on November 4th.

All sections were well represented, the exhibits in many cases being of excellent quality. The outstanding feature of the show was the number and quality of exhibits in the poultry sections.

DEPARTMENTAL NOTES.

Change of Title.

It is notified for general information that, with the approval of the Right Honourable the Secretary of State for the Colonies, the title of the appointment of Director of Agriculture, Straits Settlements and Federated Malay States, has been changed to Director of Agriculture, Straits Settlements and Advisor on Agriculture, Malay States. (No. 5551 *F.M.S. Government Gazette* November 30th 1934).

Tour of Director of Agriculture.

The Acting Director of Agriculture visited Fraser's Hill between 11th and 13th November for the purpose of inspecting the Dairy Farm at Jeriau.

Visit of Officer-in-Charge of Copra Investigations to the Philippine Islands.

Mr. F. C. Cooke, Officer-in-Charge of Copra Investigations, who left for the Philippine Islands on October 16th, returned on December 5th.

All aspects of the coconut industry were discussed and views on the economic problems of that industry were exchanged with officials of the Department of Agriculture and Commerce and with leading merchants to whom introductions were effected through the courtesy of His Britannic Majesty's Consul-General, Mr. Thomas Harrington.

Later Mr. Cooke and Mr. F. Gallang, Senior Agronomist of the Bureau of Plant Industry, paid a visit to the largest single area of coconuts in the Philippine Islands which is to be found in Southern Luzon.

Subsequently, coconut areas in Mindoro, Romblon, Cebu, Bohol, Zamboanga and Davao were similarly inspected, introductions being effected through the courtesy of His Britannic Majesty's acting Vice-Consuls at Cebu, Zamboanga and Davao respectively and the Director of the Bureau of Plant Industry at Manila.

Leave.

Mr. B. A. Lowe, Agricultural Officer, has been granted 8 months and 3 days full-pay leave from 23rd November 1934 to 25th July 1935 inclusive.

Statistical.

MARKET PRICES.

November 1934.

Rubber.—The price of rubber weakened still further during November, the lowest quotation being 20 cents per lb. The commodity opened at 21¾ cents per lb. for spot loose in Singapore and closed at 21⅜ cents, but the average price for the month was only 20.93 cents per lb. for Smoked Sheet equal to London Standard, as compared with 22.76 cents per lb. in October. The average price for November in London was 6.29 pence per lb. and in New York 12.91 cents gold per lb. as compared with 6.75 pence and 13.78 cents gold respectively in October.

Weekly prices paid during the month for small-holders' rubber at three centres are shewn in the following table.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, November, 1934.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.					Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	1	8	15	22	29	7	14	21	28	7	14	21	28
Smoked sheet		23.16	24.00	22.70	24.17	23.30	24.28	23.25	24.00	22.60			21.60
Unsmoked sheet	22.13	22.30	21.63	21.28	21.78	20.22	20.10	20.51	21.40	20.50	21.00	20.51	20.60
Scrap			13.00	13.44	13.50			13.00					

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

Palm Oil.—The following prices for the local commodity were quoted during the month.

Table II.

Date 1934.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
Nov. 2	£13.15.0	£ 6. 7. 6
„ 9	14. 0.0	6. 7. 6
„ 16	13.15.0	6. 5. 0
„ 23	14.10.0	6. 7. 6

Copra.—Prices in Singapore during November shewed little variation, but towards the close of the month, values shewed some small appreciation, and the mixed quality maintained its high value in relation to the sun-dried grade. The latter grade opened at $2.95 per picul and closed at $3.05, averaging $2.95 per picul for the month, as compared with $3.01 in October. The mixed quality averaged $2.70 per picul as compared with $2.52 in October.

Copra cake was quoted throughout the month at $1.70 per picul.

Rice.—The average wholesale prices of rice per picul in Singapore during October were as follows:—Siam No. 2 (ordinary) $3.14, Rangoon No. 1 $3.15, Saigon No. 1 (long grain) $3.05, as compared with $3.39, $3.30 and $3.30 in September. Corresponding prices in October 1933 were $3.48, $2.87 and $3.12 respectively.

The average retail market prices in cents per gantang of No. 2 Siam rice in October were:—Singapore 26, Penang 25, Malacca 24, as compared with 26, 25 and 26 respectively in September.

The average declared trade value of imports of rice in October was $3.36 per picul, as compared with $3.38 in September and $3.03 in August.

Padi.—The price paid for padi at the Government Rice Mill, Bagan Serai continued at $1.50 per picul. A privately-owned mill paid $1.30 per picul.

Tea.—Bigia (Kedah) tea was quoted at 10¾d. per lb. in London during October.

Average London prices per lb. for tea consignments from other countries were as follows:—Ceylon 1s. 2.25d., Java 10.08d., Indian Northern 1s. 0.82d., Indian Southern 11.5d., Sumatra 9.58d. Prices improved slightly at the commencement of the month, but weakened again at the close.

Tuba Root (Derris).—A much firmer note was prevailing in the Singapore market at the close of November. Continued wet weather is curtailing supplies

and, in expectation of higher prices in the new year, growers are not gathering roots. The average price in Singapore for roots sold on fair rotenone content remained unchanged at $40 per picul but the average for better qualities was $44 per picul. Roots sold on a basis of ether extract averaged $29 per picul during November as compared with $28 in October.

Gambier.—Singapore prices remained unchanged during November, quotations being $6.75 per picul for Block and $9.50 per picul for No. 1 Cube as compared with October average prices of $5.81 and $8.94 respectively.

Pineapples.—Very little business was passing during November and prices per case remained unchanged at: Cubes $3, Sliced Flat $2.85, Sliced Tall $3.25. October prices were $3.05, $3 and $3.25 respectively.

Average prices of fresh pineapple in Singapore was $2.50 per 100 for large fruits and $1.50 per 100 for small. Johore prices varied in districts from $1.20 to $3 per 100. Kedah prices were from $2 to $6 for Mauritius pines, and $7 to $10 per 100 for Sarawak pines.

Tapioca.—There was no change in Singapore prices during the month and quotations per picul were:—Flake Fair $3.50, Seed Pearl $5.50, Pearl Medium $5.85. October average prices were:—$3.45, $5.50 and $5.85 respectively.

Tobacco.—Local prices varied within a wide range according to quality. Perhaps a fair average is that reported from Perak where 1st quality was $30 to $50 per picul, 2nd quality $24 to $46 and 3rd quality $8 to $34. The price of fresh leaf was about $1.50 to $4 per picul.

Sago.—Prices in Singapore of Flour, Sarawak Fair, improved during November, averaging $2.16 per picul as compared with $2.03 in October, but Pearl, Small Fair weakened to average $3.72 per picul as compared with $3.90 in the previous month.

Mace.—Prices in Singapore continued unchanged during the month at the October level of $90 per picul for Siouw and $60 per picul for Amboina.

Nutmegs.—There was no change throughout the month in the Singapore prices of nutmegs which were $26 per picul for 110's and $27 per picul for 80's, as compared with $25 and $26 respectively in October.

Pepper.—Prices improved still further during November but eased a little at the close in sympathy with London. Average prices per picul in Singapore for the month were:—Singapore Black $21.25, Singapore White $62.25, Muntok White $64.25. The October average prices were $18.88, $55.50 and $57.38 respectively.

Cloves.—Prices in Singapore remained nominal at Zanzibar $35 and Amboina $45 per picul.

Coffee.—Prices of coffee in Singapore opened weakly but there was a slight improvement during the month. Sourabaya coffee opened at $17 to $18 per picul rising to $18 to $19.50. Palembang coffee opened at $12.75 per picul and closed at $13, an average for the month of $12.94 as compared with $12.44 in October.

Local prices of coffee appreciated over those ruling last month. Prices varied from $18 to $29 in different districts and according to quality.

Arecanuts.—Singapore average prices per picul in November were as follows :—Splits $4.87 to $6.25, Sliced $8 to $9.78, Red Whole $5.65 to $6.56, Sourabaya Whole $6.50 to $7.56. No prices were quoted for Bila Whole.

The average prices quoted by the Singapore Chamber of Commerce were :—Best $5.92, Medium $5.55, Mixed $5.14.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY*

October 1934.

Malaya.—Imports of foreign rice into Malaya during October were 53,018 tons and exports 20,300 tons, net imports accordingly being 32,718 tons. For the period January to October, 1934, net imports were 385,304 tons, an increase of 7.6 per cent.†

Of the imports during October, 59 per cent. were consigned to Singapore, 12 per cent. to Penang, 4 per cent. to Malacca, 16 per cent. to the Federated Malay States and 9 per cent. to the Unfederated Malay States. Of the total, 74 per cent. came from Siam, 24 per cent. from Burma, 1 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during the month under review, 73 per cent. were shipped to the Netherlands Indies and 27 per cent. to other countries. The various kinds of rice exported were :—Siam 13,855 tons (68.2 per cent.), Burma 3,852 tons (19 per cent.), French Indo-China 523 tons (2.6 per cent.), India 1,962 tons (9.7 per cent.), local production 108 tons (0.5 per cent.).

India and Burma.—For the period January to September 1934, foreign exports totalled 1,194,000 tons, as compared with 1,564,000 tons in 1933, a decrease of 23.7 per cent.

Total exports of rice and bran for the period 1st January to 29th September 1934, amounted to 3,247,874 metric tons, an increase of 17.7 per cent. as compared with 2,759,983 metric tons in 1933.

According to the *Indian Trade Journal,* 25th October 1934, the total planted area was reported to be 75,261,000 acres, an increase of 0.2 per cent. as compared with the corresponding estimate of 75,080,000 acres for the season 1933-34. Weather conditions were not favourable but the condition of the crop in October appeared to be generally good.

Siam.—Exports of rice from Bangkok during September were 151,167 tons, making a total of 1,334,942 tons for the period January to September 1934, as compared with 1,231,077 tons in 1933.

The padi crop for the 1933-34 season was 4,967,980 tons, a decrease of 107,810 tons as compared with the previous season.

Japan.—According to the *Trans Pacific Journal,* 18th October 1934, the following are the estimated figures for supply and demand for the period November 1934 to October 1935.

Supply :	Production	7,391,300	tons.
	Balance 1933-34 rice year ...	2,244,040	,,
	Imports	1,683,030	,,
Demand :	Domestic consumption ...	9,817,670	,,
	Exports	280,500	,,

shewing a surplus of 1,220,200 tons.

* Abridged from the Rice Summary for October, 1934, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1933.

The area for the second rice crop of Formosa was estimated to be 935,000 acres, a decrease of 26,137 acres as compared with the second crop of 1933. Production was estimated at 657,035 tons, an increase of 36,683 tons or 5.9 per cent. as compared with the second crop of 1933.

French Indo-China.—Entries of padi into Cholon, 1st January to 31st October 1934 totalled 1,360,720 metric tons, an increase of 38.8 per cent. as compared with 980,565 metric tons in 1933.

Exports of rice for the same period were 1,272,540 metric tons, as compared with 1,090,892 metric tons in 1933. An increase of 16.7 per cent.

Netherlands Indies.—The area under rice in Java and Madura harvested during the period January to August 1934, (*Economic Bulletin,* 1st November 1934) was 8,020,090 acres, as compared with 8,215,220 acres in 1933, a decrease of 2.4 per cent.

Imports of rice for this period were 126,349 metric tons, a decrease of 54.3 per cent. as compared with imports of 276,344 in 1933.

Ceylon.—Imports for the period January to October 1934, totalled 391,238 tons, an increase of 9.1 per cent. as compared with 358,626 tons in 1933.

Of the 1934 imports, 14.4 per cent. were from British India, 62 per cent. from Burma and 23.6 per cent. from other countries.

Europe and America.—Shipments from the East to Europe for the period 1st January to 25th October 1934, were 1,027,305 tons, as compared with 1,120,502 tons in 1933, a decrease of 8.3 per cent.

Of the 1934 shipments 37 per cent. were from Burma, 5 per cent. from Japan, 46 per cent. from Saigon, 10 per cent. from Siam and 2 per cent. from Bengal. The 1933 percentages were 49, 2, 41, 7, and 1 respectively.

Shipments to the Levant from the East for the period 1st January to 5th October, 1934, totalled 25,789 tons, an increase of 13.9 per cent. as compared with 22,639 tons in 1933.

Shipments to the West Indies and America for the period 1st January to 25th September, 1934, were 158,993 tons, as compared with 137,836 tons in 1933, an increase of 15.3 per cent.

MALAYAN AGRICULTURAL EXPORTS, OCTOBER, 1934.

PRODUCT.	Net Export in Tons.				
	Year 1933.	Jan.-Oct. 1933.	Jan.-Oct. 1934.	October 1933.	October 1934.
Arecanuts ...	20,756	17,733	15,386	2,803	817
Coconuts, fresh † ...	100,609†	86,401†	84,288†	7,947†	11,922†
Coconut oil ...	17,568	14,713	20,698	1,665	2,350
Copra ...	110,543	86,765	76,627	13,728	9,951
Gambier, all kinds ...	2,560	2,027	1,827	225	229
Oil cakes ...	9,992	8,373	9,777	757	1,522
Palm kernels ...	1,983	1,713	2,624	280	547
Palm oil ...	12,101	9,247	13,182	2,129	2,943
Pineapples canned ...	59,582	51,271	59,230	1,553	2,393
Rubber ¶ ...	459,836¶	372,787¶	385,956¶	41,409¶	34,075¶
Sago,—flour ...	7,648	3,787	6,631	1,182	1,071
„ —pearl ...	2,646	1,917	4,084	273	533
„ —raw ...	4,420*	3,482*	5,526*	412*	790*
Tapioca,—flake ...	9,881	8,691*	5,138	741	199
„ —flour ...	702*	182	1,656*	13	180*
„ —pearl ...	17,297	14,568	13,246	1,636	1,169
Tuba root ...	569½	399½	446½	56	24½

† hundreds in number. * net imports. ¶ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 30TH OCTOBER, 1934.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (*d*)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	1,129	2.5	7,412	16.7	609	1.4	8,541	19.2
Dindings	7,368	112	1.5	935	12.7	114	1.5	1,047	14.2
Malacca	121,152	485	.4	15,216	12.6	2,818	2.3	15,701	13.0
Penang Island	1,366	390	28.6	424	31.0	201	14.7	814	59.6
Singapore Island	28,842	2,820	9.7	4,751	16.5	495	1.7	7,571	26.2
Total S.S. ...	203,013	4,936	2.4	28,738	14.2	4,237	2.1	33,674	16.6
FEDERATED MALAY STATES :—									
Perak	253,227	4,403	1.7	34,751	13.7	13,884	5.5	39,154	15.4
Selangor	310,003	4,083	1.3	40,438	13.0	12,601	4.1	44,521	14.3
Negri Sembilan	233,592	4,981	2.1	33,258	14.2	18,654	8.0	38,239	16.3
Pahang	46,712	4,357	9.3	14,052	30.1	9,308	19.9	18,409	39.4
Total F.M.S. ...	843,534	17,824	2.1	122,499	14.5	54,447	6.5	140,323	16.6
UNFEDERATED MALAY STATES :—									
Johore	365,400	8,908	2.4	23,925	6.5	21,562	5.9	32,833	8.9
Kedah (*b*)	126,588	1,632	1.3	28,816	22.8	19,550	15.4	30,448	24.1
Kelantan	25,793	8,477	32.8	2,391	9.3	5,418	21.0	10,868	42.1
Trengganu (*b*)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2
Perlis (*c*)	1,181	Nil	Nil	266	22.5	266	22.5	266	22.5
Total U.M.S. ...	523,505	19,017	3.6	55,496	10.6	46,894	9.0	74,513	14.2
TOTAL MALAYA ...	1,570,052	41,777	2.7	206,733	13.1	105,578	6.7	248,510	15.8

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.
(*d*) Figures are as reported by estate managers.

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF OCTOBER, 1934, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
								during the month		January to Oct. inclusive 1934		during the month		January to Oct. inclusive 1934				
	Ports	Dealer	Estates of 100 acres and over	during the month	January to Oct. inclusive 1934	during the month	January to Oct. inclusive 1934	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MALAY STATES :—																		
Federated Malay States ...	...	13,189	9,546	12,986	119,040	5,498	85,359	Nil	Nil	Nil	Nil	13,241	5,847	148,192	67,667	...	12,402	9,721
Johore ...	...	3,081	2,796	3,923	37,453	2,545	43,178	Nil	124	Nil	396	1,741	6,360	16,483	66,663	...	1,759	2,609
Kedah ...	...	684	2,001	2,935	27,300	736	14,456	Nil	Nil	Nil	Nil	1,392	2,220	14,682	27,162	...	354	2,390
Perlis ...	...	23	18	17	136	11	288	Nil	Nil	Nil	Nil	Nil	33	Nil	431	...	21	15
Kelantan ...	...	211	281	283	2,540	496	6,637	Nil	Nil	319	Nil	177	682	980	8,522	...	242	170
Trengganu ...	...	55	50	189	2,253	95	1,124	Nil	Nil	Nil	Nil	Nil	284	Nil	3,377		55	50
Total Malay States	...	17,243	14,692	20,333	188,722	9,381	151,042	Nil	124	319	396	16,551	15,426	180,337	173,822	...	14,833	14,955
STRAITS SETTLEMENTS :-																		
Malacca ...	...	3,162	976	1,630	14,070	1,314		Nil		4		3,459		32,573		...	3,338	1,075
Province Wellesley	...	1,504	443	618	5,749	90		Nil		Nil						...	1,623	543
Dindings ...	...	82	144	112	1,086	62	23,298	Nil	13,854	Nil	161,621	6,670	Nil	81,177	Nil	...	58	153
Penang ...	2,695	12,735	9	11	120	146		1,581		23,398						3,026	12,081	10
Singapore ...	7,431	42,170	174	217	1,869	161		8,645		163,048		20,365		272,559		7,327	42,074	193
Total Straits Settlements	10,126	59,653	1,746	2,588	22,894	1,773	23,298	10,226	13,854	187,350	161,621	30,494	Nil	386,309	Nil	10,353	59,174	1,974
TOTAL MALAYA	10,126	76,896	16,438	22,921	211,616	11,154	174,340	10,226	13,978	187,669	162,017	47,045	15,426	566,646	173,822	10,353	74,007	16,929

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
20	21	22	23	24	25	26
DRY RUBBER	11,115	36,195	9,836	4,781	1,169	191
WET RUBBER	1,287	5,879	2,245	238	590	163
TOTAL ...	12,402	42,074	12,081	5,019	1,759	354

TABLE III
FOREIGN EXPORTS

PORTS	For month	January to Oct. 1934
Singapore ...	30,601	378,748
Penang ...	11,114	125,737
Port Swettenham.	5,044	56,528
Malacca ...	286	5,633
MALAYA ...	47,045	566,646

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	January to Oct. 1934
Malay States ...	31,978	378,977
Straits Settlements	3,851	
MALAYA ...	35,829	378,977

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i. e.*, Column [9] = Columns [15] + [16] + [19] + [20] + [21] + [22] — [4] — [5] — [6] — [7] — [11] — [12]. For the Straits Settlements, Column [9]: figures for Singapore and Penang Islands represent sales or exports as shown by cess paid and for the mainland represent as previously purchases by dealers from local estates of less than 100 acres, reduced by 15 % to terms of dry rubber.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (31) represents domestic exports, being net exports from the mainland Labuan and Brunei, plus production as represented by sales or exports in the Islands of Singapore and Penang. Column (32) represents net exports in the absence of any means of calculating domestic exports of the Straits Settlements for the period January to May inclusive. Column (32) includes from June inclusive 145, 368 tons domestic exports of which 144,975 tons are debitable to quota under the Rubber Regulation Agreement dated 7th May, 1934, and 393 tons are exports not subject to regulation. (Figures may be subject to minor adjustment.)
5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 24 November, 1934.

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1934.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B.	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	89.6	72.2	80.9	94	70	83	74	83.9	84.5	12.33	313.2	2.13	23	18	1	4		137.60	4.44	37
Bukit Jeram, Selangor ...	86.3	72.3	79.3	89	71	81	74	82.9	84.6	10.06	255.5	3.35	21	17		2		153.65	4.96	41
Sitiawan, Perak ...	88.3	73.0	80.7	91	71	85	75	83.7	84.8	5.50	139.7	1.10	16	11	1			161.10	5.20	43
Temerloh, Pahang ...	88.2	72.9	80.5	91	71	84	75	84.6	85.9	10.28	261.1	1.79	22	17	2	9		168.90	5.45	45
Kuala Lipis, Pahang ...	87.4	72 0	79.7	91	69	83	74	83.4	84.4	15.18	385.6	2.72	23	19	2	26		145.20	4.68	39
Kuala Pahang, Pahang ...	85.0	73.8	79.4	91	72	80	76	83.6	85.4	14.97	380.3	3.60	24	22				154.60	4.99	41
Kallang Aerodrome, S'pore ...	85.1	75.3	80.2	89	73	80	78	82.0	83.3	10.30	261.6	2.19	20	14	1			148.45	4.79	40
Butterworth, Province Wellesley ...	85.6	73.9	79.7	88	72	80	76	83.0	83.8	13.55	344.2	3.16	23	18	1			141.35	4.56	38
Bukit China, Malacca ...	83.8	73.7	78.7	87	71	81	76	82.5	83.5	11.20	284.5	1.96	20	19	1			134.40	4.34	36
Kluang, Johore ...	87.7	71.1	79.4	93	69	83	73	81.8	82.3	5.71	145.0	2.20	22	16		10		122.65	3.96	33
Bukit Lalang, Mersing, Johore	85.7	72.2	78.9	90	71	80	73	81.6	81.5	6.72	170.7	1.94	22	16	1	o		152.40	4.92	41
Alor Star, Kedah ...	86.5	73.8	80.1	90	72	79	76	84.6	85.1	23.70	602.0	3.15	27	23	7			151.50	4.89	41
Kota Bahru, Kelantan ...	86.8	73.8	80.3	90	72	77	75	84.2	84.9	15.91	404.1	4.01	22	19	1			161.90	5.22	43
Kuala Trengganu, Trengganu	85.6	72.9	79.3	90	71	77	75	82.6	84.2	13.47	342.1	2.19	25	23	2			153.80	4.96	41
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft. Pahang ...	73.2	62.2	67.7	77	60	69	64	71.0	71.7	16.03	407.2	2.00	24	22	7	6		105.75	3.41	28
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	71.6	57.9	64.7	74	54	68	61	70.5	70.0	14.96	380.0	1.76	29	27		1		104.10	3.36	28
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.3	59.2	64.7	74	57	66	60	—	—	14.59	370.6	1.77	27	25				103.85	3.35	28

Compiled from Returns supplied by the Meteorological Branch, Malaya